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Background: Hand gestures are an integral part of social interactions and are involved in nonverbal and verbal communication. The convey language that is expressed by motor actions, and thus depend on the interplay of various brain regions. Several functional magnetic resonance imaging studies in healthy subjects suggest the praxis network for gesture production, involving distinct frontal, parietal and temporal regions. Lesions studies in subjects with apraxia, following left brain damage corroborate these findings. However, little is known about the structural connectivity underlying gesture production. We aimed to provide novel insights into the structural connectivity of the praxis network and how it is related to gesture production.
Methods: Our sample consisted of 41 healthy subjects and of 40 patients with schizophrenia, demonstrating gesture impairments and structural network abnormalities. All participants performed a gesture production test, the test of upper limb apraxia and underwent diffusion weighted magnetic resonance imaging. Finsler geometry was used to investigate structural connectivity and graph theory to estimate global and local efficiency of the praxis network, which consists of 13 bilateral regions of interest.
Results: Our findings showed an association of gesture production with network attributes and specific connections within the praxis network. Thus, global and local efficiency and most of the intra- and interhemispheric connections within the gesture network predicted gesture production across groups. Global efficiency of the praxis network further predicted gesture production only in the patient group. Local efficiency of many ROIs and connections of interest predicted production in patients at trend-level. In contrast, there were no significant or trend-level associations of gesture production with network attributes in controls.
Discussion: The results revealed an association of impaired gesture performance with structural alterations of the praxis network, including global and local efficiency and many connections of interest. Our findings are of great importance in the understanding of the structural correlates of gesture production and shed further light on the neural underpinnings of gesture deficits in a patient group with severe social deficits.

T178. PRIOR SUB-THRESHOLD PSYCHOTIC SYMPTOMS ASSOCIATED WITH THICKER RIGHT INFERIOR FRONTAL GYRUS AMONG PATIENTS IN A FIRST EPISODE OF PSYCHOSIS

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Background: Individuals with attenuated or sub-threshold psychotic symptoms (STPS) are considered at-risk for psychosis. The notion that STPS represent "early psychosis" holds promise as it suggests the possibility of charting the developmental course of psychotic illness with neuroimaging. However, recent evidence suggests that a significant minority of patients in a first episode of psychosis (FEP) do not recall pre-onset STPS, suggesting diversity in early positive symptom course. This diversity may be reflected at the level of neurodevelopment. While imaging studies of at-risk youth and FEP patients reveal progressive trends in cortical thinning across stages of illness, none have considered the STPS history of FEP patients. To better understand neurobiological trends across illness stages, we investigate the relationships between STPS history and cortical thickness in FEP patients using a whole-brain approach.
Methods: Patients (N=93) were recruited from a specialized early intervention clinic for FEP at the Douglas Mental Health University Institute. The Circumstances of Onset and Relapse Schedule was administered to identify youth who recalled at least one of nine expert-selected STPS prior to their FEP (STPS+, N=67) compared to those who did not (STPS-, N=26). These STPS include: Suspiciousness or odd ideas of reference, odd or bizarre ideas that are not delusional, unusual or eccentric behavior, unusual perceptual experiences that are not clearly psychotic, disorganized or odd speech, inappropriate affect, hallucinations or delusions (sub-threshold), and passivity experiences. Age and sex-matched healthy controls were recruited (N=83) for comparison. Participants were scanned on a 1.5T MRI scanner between 1 and 3 times at baseline, at 1-year follow-up, and at 2-year follow-up. Structural T1-weighted images were processed through the CIVET 2.1 pipeline. Cortical thickness values of 320 scans (143 HC, 123 STPS+, 54 STPS-) that passed quality control were extracted for group analysis. Linear mixed effects models controlling for effects of age, sex, education, and mean whole-brain thickness were applied to obtain vertex-wise F-test maps comparing groups.
Results: Post-hoc vertex-wise t-test maps were thresholded with Random Field Theory (p-cluster=0.001) and revealed that compared to controls, only STPS- patients exhibited significantly thinner cortical thickness in the right inferior frontal gyrus (peak $t(162.3)=4.13$, $p<0.001$). Examination of mean cortical thickness within this cluster, comparing patient groups only, revealed that compared to STPS+ patients, STPS- patients exhibited significantly thinner cortical thickness ($t(172)=-2.55$, $p=0.01$). This difference was most pronounced at baseline.
Discussion: These results indicate that within the right prefrontal cortex, STPS+/- patients may undergo different cortical maturation trajectories leading up to and through a first episode of psychosis. These differences may explain differential vulnerability to sub-threshold psychotic symptomology before a full-blown episode. In addition to suggesting differential underlying neurobiology related to STPS, these results suggest the importance of considering STPS history in mapping the trajectories of cortical thickness among FEP patients.

T179. DO INDIVIDUALS IN A CLINICAL HIGH-RISK STATE FOR PSYCHOSIS DIFFER FROM HEALTHY CONTROLS IN THEIR CORTICAL FOLDING PATTERNS?

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Background: Volumetric brain differences between persons meeting criteria for a clinical high-risk state for psychosis (CHR) and healthy controls (HC) have been previously reported, yet little is known about potential abnormalities in surface-based morphological measures. Gyrification (i.e., the amount of cortical convolution) remains relatively stable across the lifespan and is minimally influenced by ubiquitous confounding factors (e.g., drug use, medication, or stress). Recently, a multi-site analysis conducted in 104 CHR persons found global increases in cortical gyrification compared to HC (Sasabayashi et al. 2017). If replicated, gyrification abnormalities in CHR could potentially serve as early neuromarkers of elevated risk, and thus could eventually be used to identify objectively and efficiently the CHR state.
Methods: A total of 124 CHR and 264 HC subjects were recruited as part of the PRONIA consortium (www.pronia.eu), a large-scale international longitudinal study currently consisting of 10 European sites. Cortical surfaces were reconstructed from structural MRI images using a volume-based, newly introduced technique called the Projection-Based-Thickness (PBT) as available in the SPM-based-toolbox CAT12. Local gyrification was quantified automatically across the whole brain as absolute mean curvature for each vertex of the brain surface mesh consisting of thousands of individual measurement points. Vertex-wise differences of curvature values were calculated applying a General Linear Model, corrected for age, gender and site effects. Results were investigated at corrected and uncorrected levels.

Results: We found no significant differences in vertex-wise gyrification between CHR and HC at either corrected or uncorrected levels ($p>0.05$). Further investigations of potential confounding site effects also did not reveal differences.
Discussion: Our preliminary findings suggest that CHR subjects do not show whole-brain gyrification abnormalities when compared with healthy subjects. These negative results agree with literature suggesting that cortical convolution might be more affected by neurodevelopmental or genetic factors, and thus deviations from normal patterns might not be detectable in heterogeneous samples of at-risk subjects wherein the etiology and ultimate prognosis is unknown. In order to better investigate differences in cortical folding and address the role of gyrification as neuroanatomical biomarker for psychosis, future investigations should focus on subgroups within CHR populations (e.g. patients groups defined by basic symptoms, ultra-high risk, or familial risk) in addition to specific analyses of individuals with higher neurodevelopmental (e.g., obstetric complications) or genetic (e.g., polygenic risk) loadings.

T180. LOWER GLUTAMATE LEVEL IN TEMPORO-PARIETAL AREA MAY PREDICT A BETTER RESPONSE TO TDCS IN SCHIZOPHRENIA: A PILOT STUDY

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Background: Transcranial Direct Current Stimulation (tDCS) is a non-invasive neuromodulation technique which uses a weak electric current from electrodes across the scalp to modulate targeted brain areas. It has been suggested that tDCS may be useful in reducing psychotic symptoms such as auditory hallucination. The aim of this study was to find alteration of key neurotransmitters in schizophrenia in temporo-parietal area (TPA) after tDCS intervention, using magnetic resonance spectroscopy (MRS) technique.
Methods: Ten schizophrenia patients with auditory hallucination were recruited from the outpatient clinic of Seoul National University Hospital (SNUH). The anode was placed over the left dorsolateral prefrontal cortex (DLPFC), and the cathode was placed over the left TPA. Patients underwent MRS scan with the very short echo time phase rotation STEAM sequence before and after the tDCS sessions, respectively.
Results: Seven of the participants completed MRS scans before and after the tDCS sessions. Positive and Negative Symptom Scale (PANSS) total and general psychophathology scale showed a significant improvement after tDCS. There was no significant difference between glutamate/creatinine (Cr) level before and after tDCS sessions. However, a significant positive correlation between the pre-tDCS glutamate/Cr value in left TPA and the improvement in auditory hallucination measured by Auditory Hallucination Rating Scale (AHRS) after tDCS was found.
Discussion: The results of this investigation show that the schizophrenia patients whose auditory hallucination benefits the most from tDCS treatment had lower glutamate/Cr level in left TPA. Previous studies regarding the relationship between glutamatergic system and treatment response mostly have only focused on the frontal area and striatum. However, this study suggests a potential role of glutamatergic system in TPA in predicting treatment response of auditory hallucination.

T181. ABNORMAL FRONTAL AND PARIETAL SYNAPTIC GAIN RESPONSES IN FIRST EPISODE SCHIZOPHRENIA DURING A P300 TARGET DETECTION TASK

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Background: The "dysconnection hypothesis" proposes that schizophrenia is best understood in terms of aberrant brain functional integration and synaptic neuromodulation, which may underlie illness psychopathology and cognitive decline. Impairments in the P300 potential are well documented in schizophrenia and progressive over the years with the illness. We used Dynamic Causal Modeling (DCM) to investigate intrinsic (self-) connectivity in a frontoparietal cortical hierarchy during a P300 task; that is, how evoked activity results from the dynamics of coupled neural populations and how neural coupling changes with the experimental factors.
Methods: Thirty-one patients with schizophrenia (16 first episode and 15 chronic patients) and 31 healthy controls underwent EEG recordings during an auditory oddball paradigm to elicit the P300 response. We studied 16 frontoparietal models (primary auditory, superior parietal, and superior frontal sources) and identified an optimal model of neural coupling, explaining illness 'diagnosis' and 'chronicity' effects, as well as their interactions with 'task condition'.
Results: The winning model included changes in connectivity in all 3 hierarchical levels. Compared to healthy controls, all patients (chronic and first episode) showed decreased self-inhibition – i.e., increased cortical excitability – in right superior parietal gyrus across task conditions. On the other hand, first episode patients – but not chronic – showed in the left frontal and parietal source a reversal of the normal synaptic gain changes in response to targets, relative to standard tones.
Discussion: We confirmed that both subjects with chronic and first episode schizophrenia show a context-independent loss of parietal synaptic gain control. Importantly, in the highest levels of the hierarchy, first episode patients showed a specific abnormal gain modulation pattern in response to task-relevant stimuli not present in those chronically treated. Abnormal synaptic gain is plausibly caused by NMDA-receptor and/or GABAergic pathologies that change the excitability of superficial pyramidal cells, and may be independent of illness advance and chronic pharmacological treatment.

T182. SHARED AND DISTINCT ALTERATIONS IN THE WHITE MATTER TRACTS OF REMITTED AND NON-REMITTED PATIENTS WITH SCHIZOPHRENIA

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Background: Antipsychotic drugs are the standard treatment for schizophrenia; however, the treatment outcomes vary. Different treatment outcomes may be attributed to the genetic and molecular heterogeneity of patients, which may be represented in the white matter structures of the brain. In the present study, we assessed the association between white matter tract integrity and treatment outcomes in patients with schizophrenia.
Methods: We evaluated 96 patients with schizophrenia (remitted, 53; non-remitted, 43) and 50 healthy controls through diffusion spectrum imaging with a 3 Tesla magnetic resonance imaging scanner. Patients were categorized into the remission and non-remission groups according to the criteria proposed by The Remission in Schizophrenia Working Group (RSWG) on the basis of PANSS scores. White matter tract integrity was assessed through an automatic tract-specific analysis method to determine the mean generalized fractional anisotropy (GFA) values of the 76 white matter tract bundles in each participant.
Results: Analysis of covariance revealed that 7 tracts, namely the bilateral fornices, the bilateral uncinate fasciculi, and the callosal fibers (CFs) of the bilateral temporal poles, bilateral hippocampi, and bilateral amygdalae, had